

# AVIATION NOISE



This chapter describes the methods and assumptions used to develop the noise exposure maps for Santa Barbara Airport. Noise exposure maps have been prepared for three study years: 2003, 2008, and 2025. The 2003 noise exposure map is intended to represent current airport operations and is based upon noise and operational data for calendar year 2002. The 2008 and 2025 noise exposure maps are based upon the forecast developed in Chapter Two of this document. The 2003 and 2008 noise exposure maps are the basis for the official Noise Exposure Maps required under F.A. R. Part 150.

This aircraft noise analysis relies upon complex data and analytical methods, and uses numerous technical terms. A

Technical Information Paper (TIP) entitled “The Measurement and Analysis of Sound” is included in the last section of this document. The TIP provides background information which will help the reader to understand the contents of this chapter.

## ***AIRCRAFT NOISE MEASUREMENT PROGRAM***

A noise measurement program was conducted at six locations in the vicinity of the airport during the spring of 2003. The field measurement program was designed and undertaken to provide real data for comparisons with the computer-predicted values. These comparisons provide insights into the actual noise conditions around the airport and can serve as a guide for evaluating the assumptions developed for the computer modeling.

It must be recognized that field measurements made over a five-day period are applicable only to that period of time and may not — in fact, in many cases, do not — reflect the average



conditions present at the site over a much longer period of time. The relationship between field measurements and computer-generated noise exposure forecasts is analogous to the relationship between weather and climate. While an area may be characterized as having a cool climate, many individual days of high temperatures may occur. In other words, the modeling process derives overall average annual conditions (climate), while field measurements reflect daily fluctuations (weather).

Information collected during the noise monitoring program included 24-hour measurements for comparison with computer-generated CNEL values. CNEL -- community noise equivalent level -- is a measure of cumulative sound energy during a 24-hour period, with penalties applied to evening and nighttime events.

## **ACOUSTICAL MEASUREMENTS**

This section provides a technical description of the acoustical measurements which were performed for the Santa Barbara Airport F.A.R. Part 150 Noise Compatibility Study Update. Described here are the instrumentation, calibration procedures, general measurement procedures, and related data collection items and procedures.

### **Instrumentation**

The Santa Barbara Airport noise van was used to measure noise at each site. The noise van is equipped with a Bruel

& Kjaer 4435 noise analyzer and Bruel & Kjaer 4184 microphone. The unit is calibrated every four hours to assure consistency between measurements at different locations.

### **Measurement Procedures**

Two methods were used to attempt to minimize the potential for non-aircraft noise sources, to unduly influence the results of the measurements. First, for single-event analysis, minimum noise thresholds of five to ten decibels (dB) greater than ambient levels were programmed. This procedure resulted in the requirement that a single noise event exceed a threshold of 65 dB at each site before being recorded. Second, a minimum event duration longer than the time associated with ambient single events above the threshold (for example, road traffic) was set (generally at five seconds). The combination of these two factors limited the single events analyzed in detail to those which exceeded the preset threshold for longer than the preset duration. In spite of these efforts, contamination of the single event data is always possible.

Although only selected single events were specially retained and analyzed, the monitors do cumulatively consider all noise present at the site, regardless of its level, and provide hourly summations of Equivalent Noise Levels (Leq). Additionally, the equipment optionally provides information on the hourly maximum decibel level, SEL values, for each event which exceeds the preset threshold and duration, and distributions of decibel levels throughout the measurement period.

## **Aircraft Noise Measurement Sites**

Noise measurement sites are shown on **Exhibit 3A**. They were selected on the basis of background information, local observations during the field effort, and suggestions from Airport Management based on noise complaint history. Specific selection criteria include the following:

- Emphasis on areas of marginal or greater than marginal aircraft noise exposure according to earlier evaluations.
- Screening of each site for local noise sources or unusual terrain characteristics which could affect measurements.
- Location in or near areas from which a substantial number of complaints about aircraft noise were received, or where there are concentrations of people exposed to significant aircraft overflights.

While there is no end to the number of locations available for monitoring, the selected sites fulfill the above criteria and provide a representative sampling of the varying noise conditions in the airport vicinity. Five sites were measured for 24-hour periods and one site for 48 hours.

Site 1 is located at 843 Raddue Avenue within Goleta. This home is approximately 10,000 feet southeast of the airport. The site is in a single-family residential area composed of contemporary homes on small lots. The site is in an area that would likely

receive regular arrival and departure overflight noise from Runway 7-25.

The event 24-hour equivalent sound level (Leq) for the measurement period at Site 1 was 55.6. The event CNEL(24) level for this site was computed to be 57.3 for the 24-hour period. There were 117 events recorded during the 24-hour measurement period.

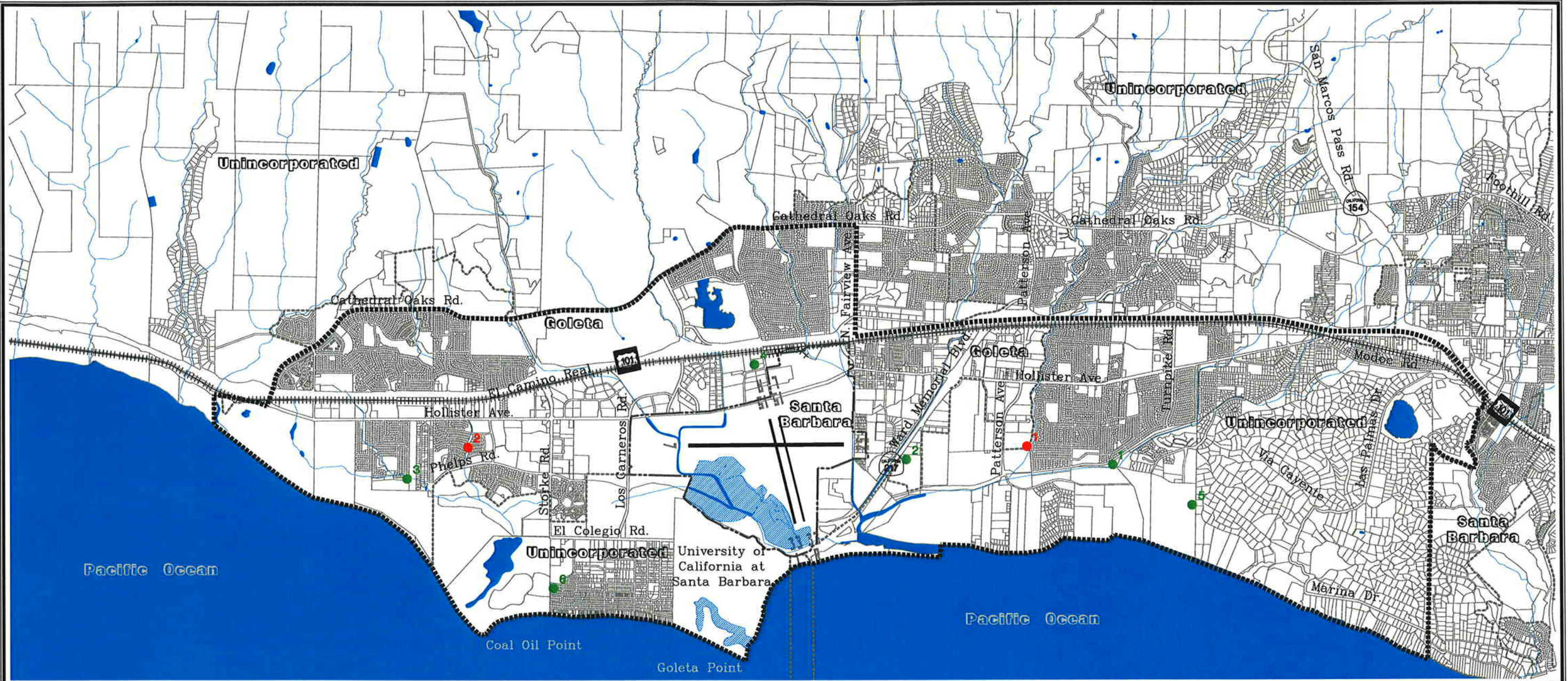
Site 2 is located in the Rancho Goleta neighborhood in Goleta. This home is approximately 2,000 feet southeast of the airport. The area consists of single-family manufactured homes on small lots.

The event 24-hour equivalent sound level (Leq) for the first day at Site 2 was 57.7 and 56.4 for the second day. The CNEL(24) level for this site was computed for the first day at 60.6 and 58.6 for the second day. There were 852 events recorded during the 48-hour measurement period.

Site 3 is located at 495 Coronado, approximately 9,000 feet west of the airport. The area is a large single-family residential area of contemporary homes on small lots.

The event 24-hour Leq for the day at Site 3 was 54.1. The event CNEL(24) level for this site was computed to be 57.9 for the 24-hour period. There were 285 events recorded during the 24-hour measurement period.

Site 4 is located at 6326 Lindmar. The area is a mix of light industrial and professional office. The site is in an area that would likely receive regular arrival and departure overflight noise from Runways 15L/R - 33L/R.



# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- Permanent Airport Noise Monitor Location
- F.A.R. Part 150 Study Noise Monitor Location
- Water
- Marsh/Slough

Source: Santa Barbara Municipal Airport.  
 Airport Noise Monitoring:  
 Site 1 - March 2 to April 3, 2003  
 April 24, 2003  
 Site 2 - March 2 to April 3, 2003  
 February 19-20, 2003  
 Site 3 - February 27, 2003  
 Site 4 - February 22, 2003  
 Site 5 - May 7, 2003  
 Site 6 - April 30, 2003



The event 24-hour Leq for the day at Site 4 was 53.4. The event CNEL(24) level for this site was computed to be 55.9 for the 24-hour period. There were 94 events recorded during the 24-hour measurement period.

Site 5 is located at 4691 Via Roblada in the Hope Ranch neighborhood. This home is approximately 13,000 feet southeast of the airport. The area is comprised of large single-family dwellings on large lots. The site is in an area that would likely receive regular arrival and departure overflight noise from Runway 7-25.

The event 24-hour Leq for the day at Site 5 was 46.9. The event CNEL(24) level for this site was computed to be 50.6 for the 24-hour period. There were 49 events recorded during the 24-hour measurement period.

Site 6 is located at 6870 Pasado Road in the Isla Vista neighborhood. The area is a single-family residential area of contemporary homes on small lots. There was a large privacy fence between the front yard and Pasado Road.

The event 24-hour Leq for the day at Site 6 was 47.0. The event CNEL(24) level for this site was computed to be 50.9 for the 24-hour period. There were 21 events recorded during the 24-hour measurement period.

## **MEASUREMENT RESULTS SUMMARY**

The noise data collected during the measurement period is presented in **Table 3A**. The information includes

the total and event 24-hour Leq for each site. The total Leq metric is derived by accumulating all noise during a given period and logarithmically averaging it. The event Leq metric is derived by accumulating all noise events that exceed the 65 dBA threshold for longer than five seconds and logarithmically averaging it. It is similar to the CNEL metric except that no extra weight is attached to evening and nighttime noise.

Total CNEL(24) is derived by accumulating all noise during a given period and logarithmically averaging it with penalties applied to evening events (4.77 dBA) and nighttime events (10 dBA). Event CNEL(24) is derived by accumulating all noise events that exceed the 65 dBA threshold for longer than five seconds and logarithmically averaging it with similar penalties applied to evening and nighttime events.

In addition, the L(50) values for each site are presented. These values represent the sound levels above which 50 percent of the samples were recorded. All of the cumulative data presented represents the average values for the duration of the measurements at each site.

For comparative purposes, normal conversation is generally at a sound level of 60 decibels, while a busy street is approximately 70 decibels along the adjacent sidewalk.

The program resulted in a total of one 48-hour period, and five 24-hour periods from six sites around the airport. A total of 1,418 single events were recorded during the program.

<b>TABLE 3A</b> <b>Measurement Results Summary</b> <b>Santa Barbara Airport</b>							
	Site 1	Site 2	Site 2 <sup>1</sup>	Site 3	Site 4	Site 5	Site 6
<b>Measurement Date</b>	4/24	2/19	2/20	2/27	2/22	5/7	4/30
<b>Cumulative Data</b>							
Total LEQ(24)	56.7	59.5	58.2	57.1	56.8	53.0	51.4
Event LEQ (24)	55.6	57.7	56.4	54.1	53.4	46.9	47.0
Total CNEL(24)	58.9	63.4	61.6	61.0	62.1	56.4	55.2
Event CNEL (24)	57.3	60.6	58.6	57.9	55.9	50.6	50.9
L(50)	45.2	53.1	51.7	51.5	52.5	45.8	44.8
<b>Single Events Data</b>							
Number of Single Events	117	460	392	285	94	49	21
Source: Santa Barbara Airport Noise Van- March 19, 20, 22, 27; April 24, 30; and May 7, 2003.							

## ***AIRCRAFT NOISE MODELING METHODOLOGY***

The most widely used method for predicting aircraft noise levels in the vicinity of an airport is the FAA Integrated Noise Model (INM), which has been approved by the FAA for use in F.A.R. Part 150 studies. The INM has evolved over a period of more than twenty years to incorporate acoustical and performance data for most of the aircraft in the current U.S. fleet. The INM was primarily designed as a planning tool, and it uses national average values to predict noise levels at any given airport.

The latest versions of the INM are quite sophisticated, accounting for such variables as airfield elevation, temperature, headwinds, and local topography in predicting noise levels at a given location. INM Version 6.1 (the latest release at the time of the study) was used to prepare noise exposure maps for the Santa Barbara Airport noise analyses.

The INM predicts noise levels at a set of grid points surrounding an airport. The numbers and locations of grid points are established during the INM run, to determine noise levels in the areas where operations are concentrated, depending upon the tolerance and level of refinement specified by the user. The noise level values at the grid points are used to prepare noise contours which connect points of equal noise exposure. INM will also calculate the noise levels at a user-specified location, such as the noise monitoring sites or permanent noise monitoring terminal.

## ***INM INPUT ASSUMPTIONS***

### ***AIRPORT AND STUDY AREA DESCRIPTION***

Inputs to the INM include runway configuration, flight track locations, aircraft fleet mix, stage length (trip length) for departures, and numbers of daytime and nighttime operations by aircraft type. The INM provides a database for Santa Barbara Airport,

which locates the runways in terms of latitude and longitude, as well as elevation and temperature. The INM also includes a database for the commercial and military aircraft which commonly operate at Santa Barbara Airport. For propeller-driven general aviation aircraft, relatively few aircraft descriptions are available. **Exhibit 3B** depicts the INM input assumptions.

The INM computes typical flight profiles for aircraft operating at the airport location, based upon the field elevation, annual average temperature, and flight procedure data provided by aircraft manufacturers. The INM will also accept user-provided input, although the FAA reserves the right to accept or deny the use of such data depending upon its statistical validity. The Santa Barbara field elevation is 10 feet above mean sea level (MSL). The average annual temperature is 59.1 degrees Fahrenheit (F) for Santa Barbara.

It is also possible to incorporate a topographic database into the INM,

which allows the INM to account for the changes in distances from aircraft in flight to elevated receiver locations. Topographic data from the U.S. Geographical Survey was used in the development of the noise exposure contours for Santa Barbara Airport.

## ACTIVITY DATA

Noise evaluations were made for the current year based on actual operations for calendar year 2002.

Five-year (2008) and long-term (2025) contour sets were also prepared. Existing and forecast operations are summarized in **Table 3B**.

The airline category in **Table 3B** generally consists of air carrier and commuter operations. The air cargo category consists of both turbojet and commuter cargo operations. Charter operations generally make up the air taxi category. General aviation consists of small business jet, propeller, and helicopter operations.

**TABLE 3B**  
**Existing and Forecast Annual Operations**  
**Santa Barbara Airport**

Operation Type	2003 <sup>1</sup>	2008 <sup>2</sup>	2025 <sup>2</sup>
Airline	26,880	30,400	38,000
Air Cargo	2,692	3,200	4,100
Air Taxi	10,643	11,400	14,100
Military	1,136	1,100	1,100
General Aviation	120,967	129,200	158,700
Grand Total	162,319	175,300	216,000

Sources:

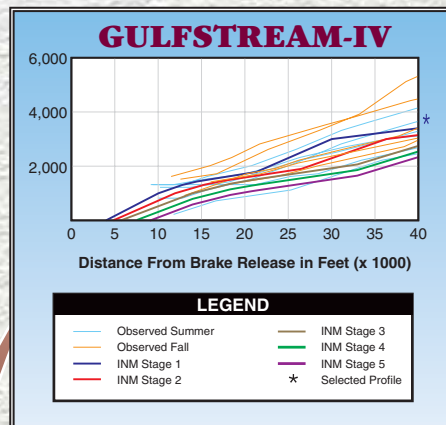
<sup>1</sup> Airport Traffic Control Tower Records for 2002 calendar year. This includes an estimate of operations not counted by the tower when it is closed.

<sup>2</sup> Aviation forecast presented in Chapter Two of this document.

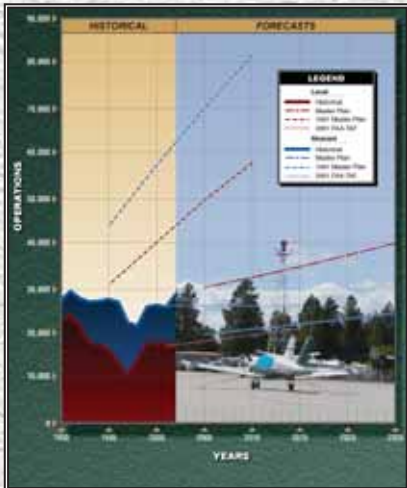
## FLIGHT TRACKS



## PROFILE ANALYSIS



## EXISTING & FORECAST OPERATIONS/FLEET MIX

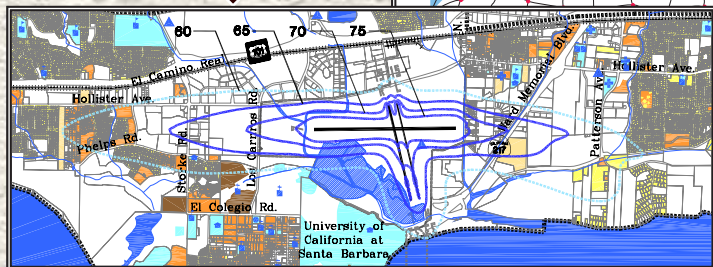
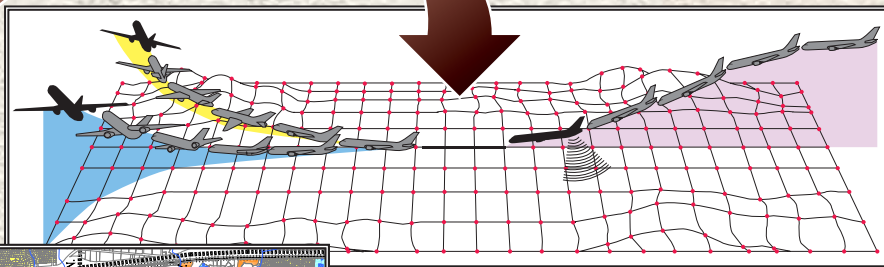


## RUNWAY DATA



# INTEGRATED NOISE MODEL 6.1

## GRID POINT ANALYSIS



## NOISE CONTOURS

## DAILY OPERATIONS AND FLEET MIX

For this analysis, current aircraft operations (takeoffs and landings) data and forecasts of future (2008 and 2025) activity prepared as part of an operations forecast update done as part of this study were used for noise modeling. The commercial, air taxi and cargo fleet mix was developed using airport landing reports for the existing condition and forecast fleet mix assumptions prepared previously in Chapter Two. The general aviation business jet operation mix was developed using FAA's instrument flight rule (IFR) database. The remaining portion of general aviation operation mix was developed using the Santa Barbara Airport based aircraft fleet mix.

Average daily aircraft operations were calculated by dividing the total annual operations by 365 days. **Table 3C** lists the daily operations by aircraft type.

## DATABASE SELECTION

To select the proper aircraft from the INM database, a review of the current fleet mix for each airline and user group at Santa Barbara Airport was conducted. The 737 series aircraft were modeled with the 737500. Hushkitted B-737 aircraft were modeled with the 737N9.

Regional jet and turboprop aircraft in the commuter fleet are represented by the INM designators GV, CL601, EMB120, and SF340. These selections are commensurate with the Approved Substitution List.

The air cargo/air taxi operations at Santa Barbara Airport are distributed between four generalized aircraft types. The single engine piston, small twin turboprop, medium twin turboprop, and large twin turboprop aircraft are modeled with INM designators GASEPF, CNA441, DHC6, and HS748A, respectively.

The INM provides data for most of the business turbojet aircraft in the national fleet. The LEAR25 and LEAR35 effectively represent the small Stage 2 and 3 business jets in the Santa Barbara fleet. The GIIBQ and GIV designator effectively represents the larger Stage 2 and 3 business jets.

The military operations are represented in the model by the INM designator S70 helicopter.

General aviation operations were modeled with GASEPF and GASEPV representing the small single engine piston aircraft. The BEC58P was chosen for the twin pistons and CNA441 for the twin turboprops. Helicopter operations are modeled using the B206L.

All substitutions depicted on **Table 3C** are commensurate with published FAA guidelines.

## Single Event Analysis

Measured single event noise levels were used to verify and refine noise modeling assumptions for existing and future conditions at Santa Barbara. The single event noise level comparisons were performed using the Santa Barbara Airport permanent noise monitoring and flight track system.

**TABLE 3C**  
**Existing and Forecast Daily Operations**  
**Santa Barbara Airport**

<b>Aircraft Class</b>	<b>INM Designator</b>	<b>2003<sup>1</sup></b>	<b>2008<sup>2</sup></b>	<b>2025<sup>2</sup></b>
<b>Air Carrier</b>				
<i><b>Turbojet</b></i>				
B737-500	737500	0.00	0.00	15.62
CRJ-900	GV	0.00	0.00	10.41
CRJ-700	GV	0.00	16.66	20.82
CRJ-200	CL601	30.07	45.81	46.85
<i><b>Turboprop</b></i>				
EMB 120	EMB120	27.45	13.12	6.56
SF-340	SF340	16.12	7.70	3.85
<b>Subtotal</b>		<b>73.64</b>	<b>83.29</b>	<b>104.11</b>
<b>Air Cargo/ Air Taxi</b>				
B737-300	737300	0.00	0.00	1.92
B737-200 Hushkit	737N9	0.14	0.14	0.00
F-27	HS748A	1.42	2.74	2.74
B-1900	DHC6	1.46	1.37	2.74
Twin Engine Piston	BEC58P	5.48	4.93	8.49
Caravan	GASEPF	4.49	4.66	0.00
Twin Turboprop	CNA441	7.67	8.49	4.77
Sm./Med. Business Jet - Stage 2	LEAR25	1.08	0.55	0.00
Sm./Med. Business Jet - Stage 3	LEAR35	4.11	5.21	8.77
Large Business Jet - Stage 2	GIIBQ	1.10	0.68	0.00
Large Business Jet - Stage 3	GIV	4.11	5.21	7.12
Helicopter	SA355F	5.48	6.03	6.85
<b>Subtotal</b>		<b>36.54</b>	<b>40.00</b>	<b>49.86</b>
<b>Military</b>				
Helicopter	S70	3.11	3.01	3.01
<b>General Aviation</b>				
<i><b>Itinerant</b></i>				
Single Eng. Piston Var. Pitch	GASEPV	61.64	63.29	76.03
Single Eng. Piston Fix Pitch	GASEPF	61.64	63.29	76.03
Twin Engine Piston	BEC58P	20.83	20.27	19.18
Twin Turboprop	CNA441	18.63	21.37	28.77
Sm./Med. Business Jet - Stage 2	LEAR25	2.45	1.37	0.00
Sm./Med. Business Jet - Stage 3	LEAR35	16.62	21.10	31.51
Large Business Jet - Stage 2	GIIBQ	3.13	1.64	0.00
Large Business Jet - Stage 3	GIV	8.41	11.78	19.73
Helicopter	B206L	1.37	1.92	2.74
<b>Subtotal</b>		<b>194.73</b>	<b>206.03</b>	<b>253.97</b>
<b>General Aviation</b>				
<i><b>Local</b></i>				
Single Eng. Piston Var. Pitch	GASEPV	62.88	67.67	82.19
Single Eng. Piston Fix Pitch	GASEPF	62.88	67.67	82.19
Twin Engine Piston	BEC58P	10.93	12.60	16.44
<b>Subtotal</b>		<b>136.68</b>	<b>147.95</b>	<b>180.82</b>
<b>Total</b>		<b>444.71</b>	<b>480.27</b>	<b>591.78</b>
<b>Annual Operations</b>		<b>162,319</b>	<b>175,300</b>	<b>216,000</b>

Sources:

<sup>1</sup> Airport Traffic Control Tower Records for 2002 calendar year. This includes an estimate of operations not counted by the tower when it is closed.

<sup>2</sup> Aviation forecast presented in Chapter Two of this document.

In order to compare the INM with the permanent noise monitoring and flight track system at Santa Barbara Airport, an estimate of the distance between the aircraft and noise monitoring sites is necessary. This distance, referred to as the slant range distance, (the straight line distance from the measurement site to the aircraft), can be calculated by geometric principles from radar flight track “X” and “Y” coordinates and associated altitudes. **Exhibit 3C** shows the method of calculation. The time track from the radar flight track data can then be used to correlate noise events from the permanent noise monitors.

A detailed INM grid point analysis, using the 2003 Noise Exposure Map noise run, was completed to develop similar slant range distance and associated noise level data at each permanent noise monitor location. Data from these two sources can then be plotted on a graph for comparison.

**Exhibit 3D** shows the range of measured and Sound Exposure Level (SEL) values March 19-24, 2001, at permanent monitoring Sites 1 and 2, for the B-737-300, B-737-500, Regional Jet, SF-340, and EMB-120 aircraft types. It should be noted that there may be differences between noise levels produced for the following reasons:

- C differences in distances from the aircraft to the monitor;
- C differences in specific aircraft configurations within the general aircraft type;
- C substitution of aircraft types by the carrier after flight plans are filed, and;

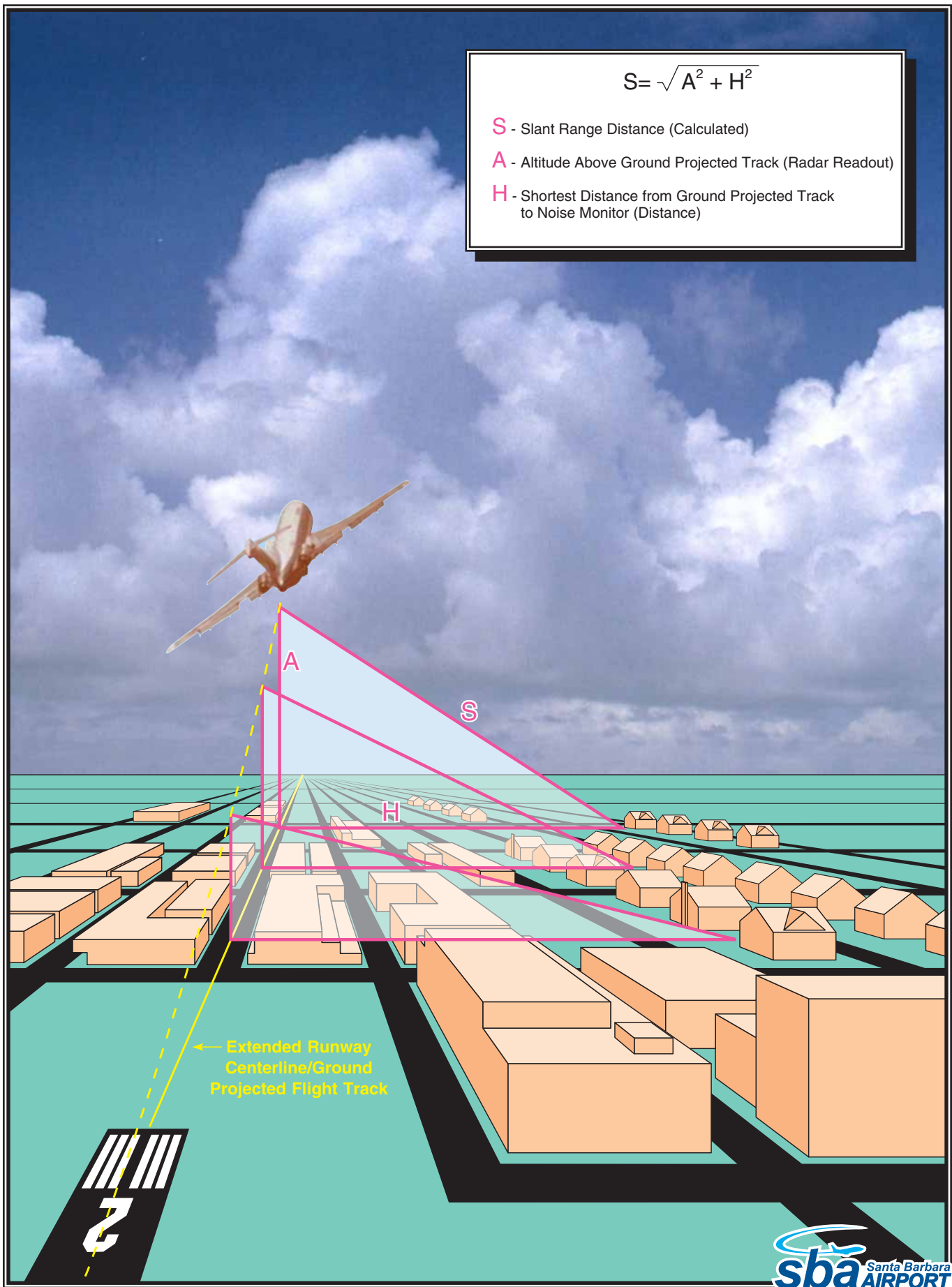
- C incorrect aircraft type designations entered by the carrier or the FAA.

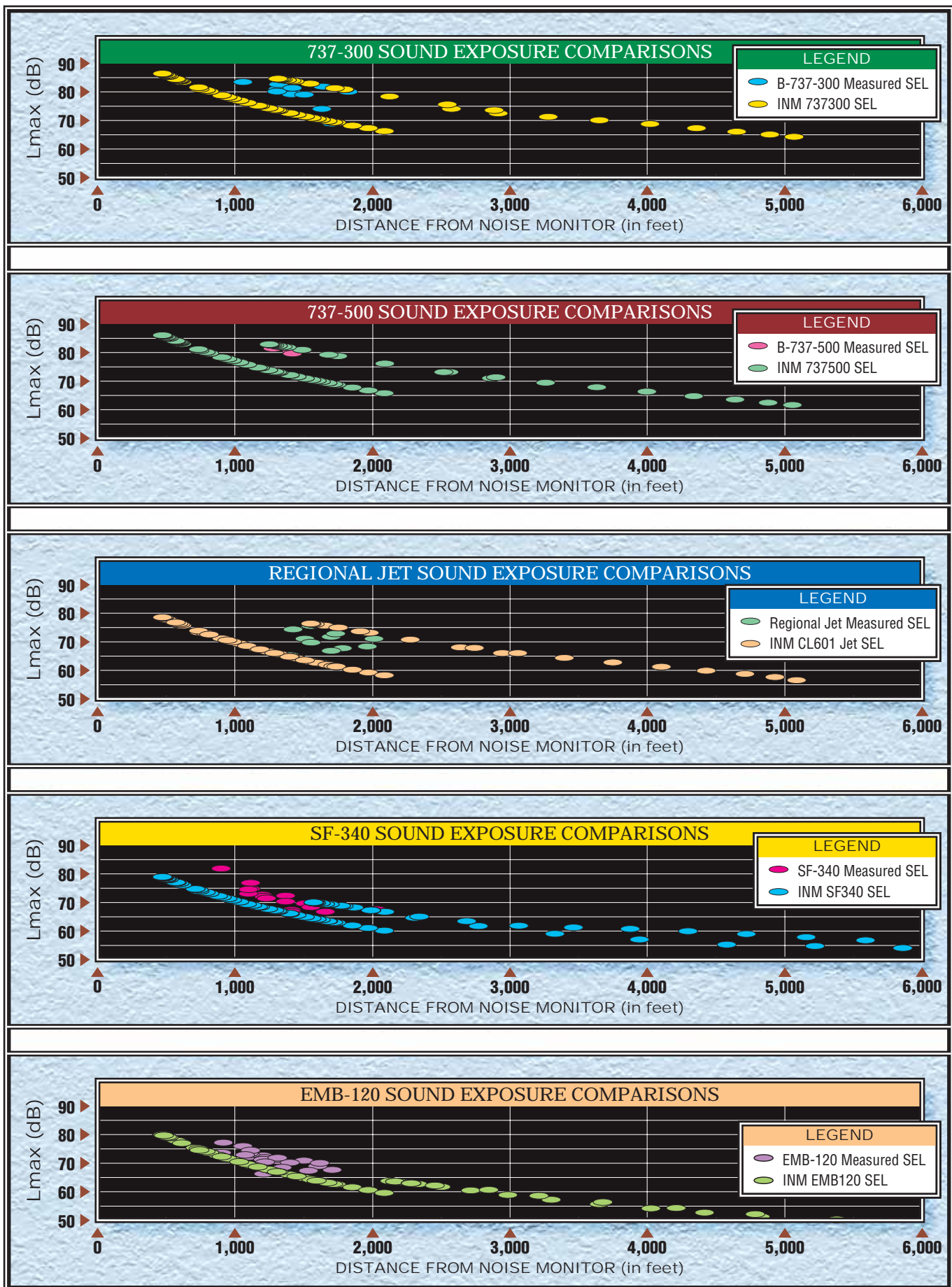
The B-737-300 measured data and INM data comparison is depicted on **Exhibit 3D**. The 737400 INM designator was used to represent this aircraft in the noise model. The B-737-300 measured data depicted on **Exhibit 3D** generally falls at the top range of the INM data. A majority of the measured data for the B-737-300 falls between 1,000 and 1,500 feet from the monitor and registers between 80 and 85 dBA.

**Exhibit 3D** depicts the B-737-500 measured data and INM data comparison. The 737500 INM designator was used to represent the B-737-500 in the noise model. The B-737-500 measured data depicted on **Exhibit 3D** is clustered near 1,200 feet and ranges from 80 dBA to 83 dBA. The INM data falls at the top range of the measured data at comparable distances (between 1,200 and 1,500 feet).

The Regional Jet measured data and INM data comparison is depicted on the bottom of **Exhibit 3D**. The CL601 INM designator was used to represent the Regional Jet in the noise model. A majority of the measured data for the Regional Jet falls between 1,500 and 2,000 feet from the monitor and registers between 65 and 75 dBA. The CL601 INM data depicted on **Exhibit 3D** generally falls at the upper range of the measured data at comparable distances (between 1,500 and 2,000 feet).

The SF-340 measured data and INM data comparison is depicted in the





Notes:

Observations from March 19-24, 2001.

Exhibit 3D

B-737-500, REGIONAL, JET SF-340, AND EMB-120  
MEASURED AND INM SOUND EXPOSURE COMPARISON

middle of **Exhibit 3D**. The SF340 INM designator was used to represent the SF-340 in the noise model. A majority of the measured data for the SF-340 falls between 1,000 and 2,000 feet from the monitor and registers between 65 and 75 dBA. The SF340 INM data depicted on **Exhibit 3D** generally falls at the lower range of the measured data at comparable distances (between 1,000 and 2,000 feet).

**Exhibit 3D** depicts the EMB-120 measured data and INM data comparison at the bottom of the exhibit. The EMB120 INM designator was used to represent the EMB-120 in the noise model. The EMB-120 measured data depicted on **Exhibit 3D** is clustered between 1,000 and 1,800 feet and ranges from 65 dBA to 77 dBA. The INM data falls at the lower range of the measured data at comparable distances (between 1,000 and 1,800 feet).

The examples above illustrate that INM aircraft selections for the B-737-300, B-737-500, Regional Jet, BAC-146, SF-340, and EMB-120 correlate well and, in some cases, tend to slightly over-predict noise for these aircraft.

### **Time of Day**

The time of day of operations is important in determining the aircraft noise exposure in terms of the Comm-

unity Noise Equivalent Level (CNEL), as nighttime operations are weighted by a factor of ten and evening operations by a factor of five. The assumed day/night distribution of aircraft operations at Santa Barbara was derived from the air carrier and air cargo flight schedules, as well as interviews with airport users, Airport staff, and the 2001 Environmental Impact Report for the Santa Barbara Airport Facilities Plan. The overall day/night distribution of operations by aircraft class is summarized by **Table 3D**.

### **Runway Use**

Annual average runway use data was taken from the May 2001 Environmental Impact Report for the Santa Barbara Facilities Plan. This runway use data was provided by the Federal Aviation Administration's (FAA's) airport traffic control tower (ATCT) at Santa Barbara Airport. **Table 3E** summarizes this data by general aircraft class. The detailed allocations of aircraft operations by runway are shown in **Appendix D**.

Runway 7-25 is the primary runway for the larger air carrier and business jet aircraft currently operating at the airport. The smaller general aviation propeller aircraft predominately use Runways 15L/R and 25.

**TABLE 3D**  
**Day/Evening/Night Distribution of Aircraft Operations**  
**Santa Barbara Airport**

Aircraft Class	INM Designator	Arrival			Departure		
		Day %	Evening %	Night %	Day %	Evening %	Night %
<b>Air Carrier</b>							
<i><b>Turbojet</b></i>							
B737-500	737500	80.0%	10.0%	10.0%	80.0%	10.0%	10.0%
CRJ-900	GV	75.0%	10.0%	15.0%	75.0%	10.0%	15.0%
CRJ-700	GV	80.0%	10.0%	10.0%	80.0%	10.0%	10.0%
CRJ-200	CL601	88.0%	10.0%	10.0%	80.0%	10.0%	10.0%
<i><b>Turboprop</b></i>							
EMB 120	EMB120	66.0%	18.0%	16.0%	69.0%	15.5%	15.5%
SF-340	SF340	76.0%	10.0%	14.0%	72.0%	14.0%	14.0%
<b>Air Cargo/ Air Taxi</b>							
B737-300	737300	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%
B737-200 Hushkit	737N9	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
F-27	HS748A	50.0%	50.0%	0.0%	100.0%	0.0%	0.0%
B-1900	DHC6	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Twin Engine Piston	BEC58P	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Caravan	GASEPF	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Twin Turboprop	CNA441	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Sm./Med. Business Jet - Stage 2	LEAR25	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Sm./Med. Business Jet - Stage 3	LEAR35	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Large Business Jet - Stage 2	GHIHQ	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Large Business Jet - Stage 3	GIV	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Helicopter	SA355F	92.0%	5.0%	3.0%	92.0%	5.0%	3.0%
<b>Military</b>							
Helicopter	S70	87.0%	10.0%	3.0%	87.0%	10.0%	3.0%
<b>General Aviation</b>							
<i><b>Itinerant</b></i>							
Single Eng. Piston Var. Pitch	GASEPV	85.0%	12.0%	3.0%	85.0%	12.0%	3.0%
Single Eng. Piston Fix Pitch	GASEPF	85.0%	12.0%	3.0%	85.0%	12.0%	3.0%
Twin Engine Piston	BEC58P	85.0%	12.0%	3.0%	85.0%	12.0%	3.0%
Twin Turboprop	CNA441	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Sm./Med. Business Jet-Stage 2	LEAR25	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Sm./Med. Business Jet-Stage 3	LEAR35	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Large Business Jet-Stage 2	GQIII	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
Large Business Jet-Stage 3	GIV	85.0%	9.0%	6.0%	85.0%	9.0%	6.0%
<i><b>Local</b></i>							
Single Eng. Piston Var. Pitch	GASEPV	85.0%	14.0%	1.0%	85.0%	14.0%	1.0%
Single Eng. Piston Fix Pitch	GASEPF	85.0%	14.0%	1.0%	85.0%	14.0%	1.0%
Twin Engine Piston	BEC58P	85.0%	14.0%	1.0%	85.0%	14.0%	1.0%

Source: March 2003 Consolidated Air Carrier Schedule, 2001 EIS/EIR for Santa Barbara Airport, and Coffman Associates analysis.

**TABLE 3E**  
**Average Annual Runway Use by Aircraft Class**  
**Santa Barbara Airport**

**Departure Runway Use**

Runway	Air Carrier Turbojet	Air Carrier Turboprop	U. S. Forest Service	General Aviation Turbojet	General Aviation Propeller
7	40%	40%	50%	40%	7%
25	60%	60%	50%	60%	28%
15R	0%	5%	0%	0%	29%
33L	0%	0%	0%	0%	1%
15L	0%	0%	0%	0%	34%
33R	0%	0%	0%	0%	1%
Total	100%	100%	100%	100%	100%

**Arrival Runway Use**

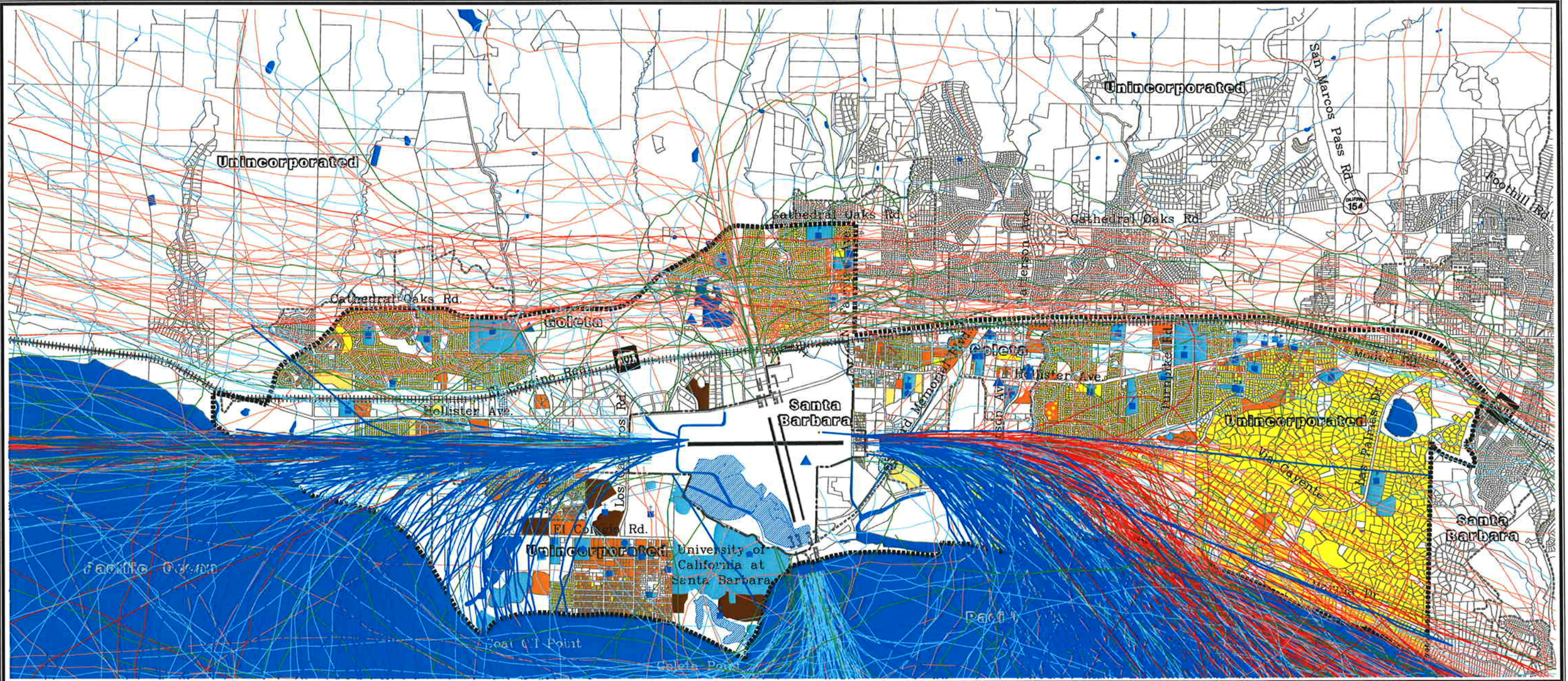
7	40%	40%	50%	40%	7%
25	60%	60%	50%	60%	28%
15R	0%	0%	0%	0%	29%
33L	0%	0%	0%	0%	1%
15L	0%	0%	0%	0%	34%
33R	0%	0%	0%	0%	1%
Total	100%	100%	100%	100%	100%

Source: May 2001 EIS/EIR for the Santa Barbara Airport Facilities Plan.

## Flight Tracks

Local and regional air traffic control procedures and actual radar flight track data were used to develop consolidated flight tracks. The result is a series of consolidated flight tracks describing the average corridors that lead to and from Santa Barbara Airport.

For developing flight tracks for input into the INM, ARTS IIE, radar data was used. **Exhibit 3E** depicts the radar flight track data for Santa Barbara Airport during a five-day period (March 19-24, 2001) and observations downloaded from the flight track monitoring system from February 14-20, 2003.



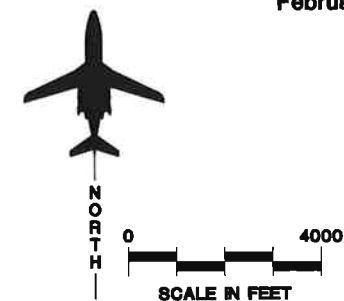
# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- Jet Departure Tracks
- Turbo-Prop Departure Tracks
- General Aviation Departure Tracks
- Jet Arrival Tracks
- Turbo-Prop Arrival Tracks
- General Aviation Arrival Tracks

- General Aviation Touch and Go Tracks
- Manufactured Housing
- Single-Family Residential - 0 to 1 du/Acre
- Multi-Family Residential - 1.1 to 3 du/Acre
- High Density Residential - 14+ du/Acre
- Noise Sensitive Institutions
- Retirement Home
- + Place of worship
- + School
- + Hospital

- Day Care Center
- Historic Resource
- Water
- Marsh/Slough

Source: Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001, and February 14, 15, 16, 18, 19 and 20, 2003.



As seen on **Exhibit 3E**, there are three corridors where the radar flight track data is heavily concentrated: straight south of the Airport; straight west of the Airport; and southeast of the Airport. Lighter concentrations of radar flight track data are found north of the Airport.

**Exhibit 3F** depicts the consolidated commercial departure flight tracks developed for the aircraft for input into the INM. INM consolidated flight tracks are developed by plotting the centerline of a concentrated group of tracks and then dispersing the consolidated tracks into multiple sub-tracks that conform to the radar flight track data. The light-blue-colored lines on **Exhibit 3F** are the radar flight track data. The wider, dark green lines represent the centerline, or spine of each group of radar track data. As seen on **Exhibit 3F**, commercial aircraft (scheduled air carrier, air taxi, cargo, and business jet) depart exclusively from Runway 7-25.

General aviation departures are depicted on **Exhibit 3G**. General aviation departures are generally able to climb quicker and turn sooner. Therefore, general aviation departures have a tendency to be more dispersed off each runway end.

**Exhibit 3H** depicts the arrival stream and consolidated commercial flight tracks at Santa Barbara Airport. The light-red-colored lines on **Exhibit 3H** are the radar flight track data. The wider, dark red lines represent the centerline, or spine of each group of radar flight track data.

Commercial arrival tracks at Santa Barbara Airport are generally concentrated on the Runway 7-25 centerline due to the precision needed to safely land an aircraft. Because Runway 7 has an instrument approach system, the arrival stream has a tighter concentration of aircraft on the extended runway centerline than on Runway 25. In addition, for noise abatement, aircraft generally try to remain over the large undeveloped area southeast of the airport prior to lining up on the runway centerline.












Consolidated general aviation aircraft are depicted on **Exhibit 3J**. The smaller general aviation aircraft are able to make shorter approaches to the airport and, therefore, are significantly more dispersed off each runway end.

General aviation consolidated touch-and-go and helicopter flight tracks are depicted on **Exhibit 3K**. As seen on **Exhibit 3K**, touch-and-go activity can be found on all sides of the airport. Helicopter arrival and departure tracks generally follow Interstate Highway 101 north of the Airport and over the ocean south of the airport.

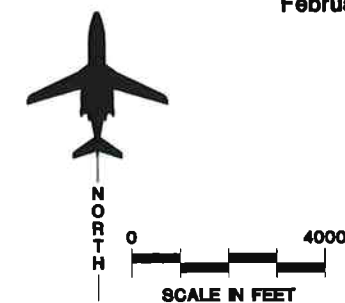
## **Flight Profiles**

One of the variables which affect single event noise levels at a given measurement location is the actual flight profile of the aircraft as it passes over the measurement site. In the INM, a flight profile is comprised of three parameters: thrust, speed, and altitude. The thrust value bears a direct linear relationship to the












- Detailed Land Use Study Area
- Municipal Boundary
- ==== Airport Property
- + + + + + Railroad Tracks
- ← Consolidated Departure Track
- Consolidated Departure Sub Tracks
- 6RDB Flight Track Designator
- Radar Departure Tracks
- Manufactured Housing
- Single-Family Residential - 0 to 1 du/Acre

- |   |  |   |                     |
|---|--|---|---------------------|
|  | <b>Multi-Family Residential - 1.1 to 3 du/Acre</b> |  | <b>Water</b>        |
|  | <b>High Density Residential - 14+ du/Acre</b>      |  | <b>Marsh/Slough</b> |
|  | <b>Noise Sensitive Institutions</b>                |   |                     |
|  | <b>Retirement Home</b>                             |   |                     |
|  | <b>Place of worship</b>                            |   |                     |
|  | <b>School</b>                                      |   |                     |
|  | <b>Hospital</b>                                    |   |                     |
|  | <b>Day Care Center</b>                             |   |                     |
|  | <b>Historic Resource</b>                           |   |                     |

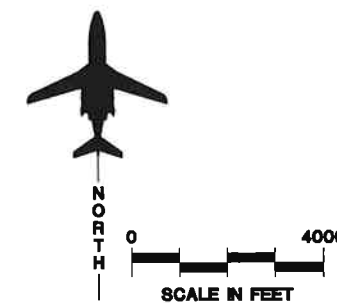
**Source:** Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001, and February 14, 15, 16, 18, 19 and 20, 2003.

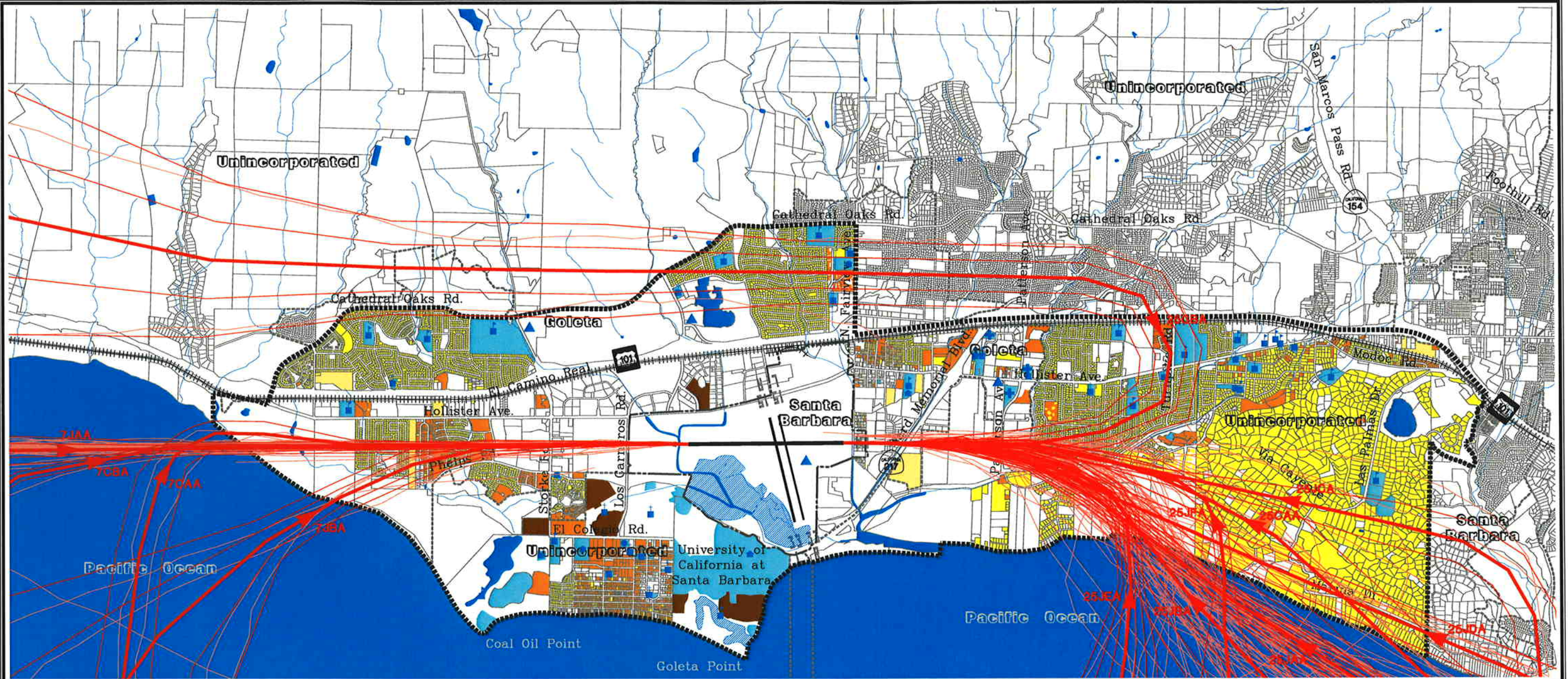


-  Detailed Land Use Study Area
-  Municipal Boundary
-  Airport Property
-  Railroad Tracks
-  Consolidated Departure Track
-  Consolidated Departure Sub Tracks
-  Flight Track Designator
-  Radar Departure Tracks
-  Manufactured Housing
-  Single-Family Residential - 0 to 1 du/Acre

- |   |   |   |              |
|---|---|---|--------------|
|  | Multi-Family Residential - 1.1 to 3 du/Acre |  | Water        |
|  | High Density Residential - 14+ du/Acre      |  | Marsh/Slough |
|  | Noise Sensitive Institutions                |   |              |
|  | Retirement Home                             |   |              |
|  | Place of worship                            |   |              |
|  | School                                      |   |              |
|  | Hospital                                    |   |              |
|  | Day Care Center                             |   |              |
|  | Historic Resource                           |   |              |

**Source:** Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001.





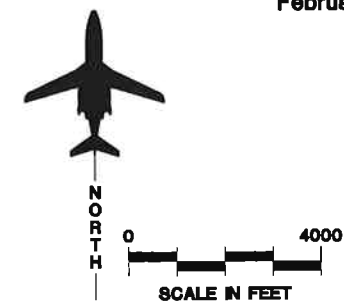
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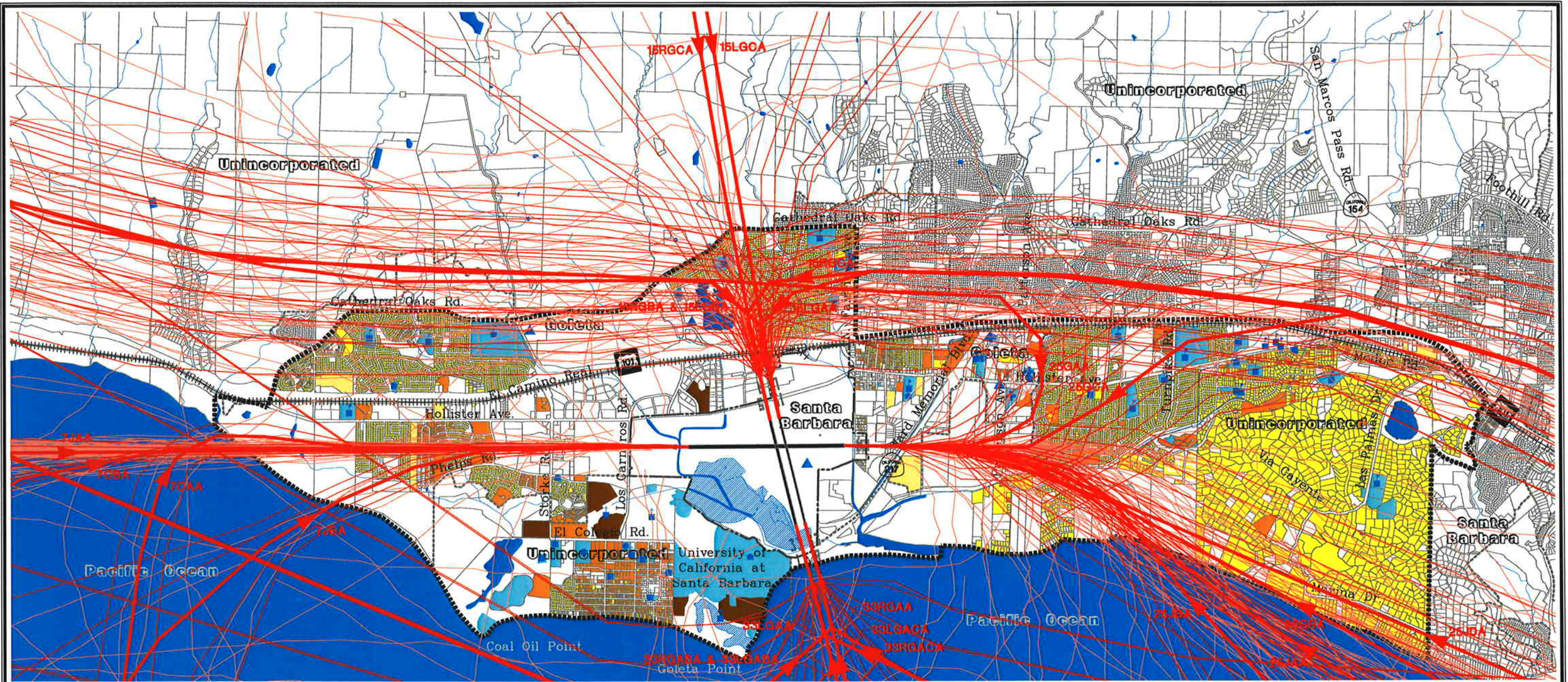
- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- Consolidated Arrival Tracks
- Consolidated Arrival Sub Tracks
- 6RDB Flight Track Designator
- Radar Arrival Tracks
- Manufactured Housing
- Single-Family Residential - 0 to 1 du/Acre

- Multi-Family Residential - 1.1 to 3 du/Acre
- High Density Residential - 14+ du/Acre
- Noise Sensitive Institutions
- Retirement Home
- + Place of worship
- ▤ School
- ⛶ Hospital
- ⛶ Day Care Center
- ▲ Historic Resource

- Water
- Marsh/Slough

Source: Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001, and February 14, 15, 16, 18, 19 and 20, 2003.





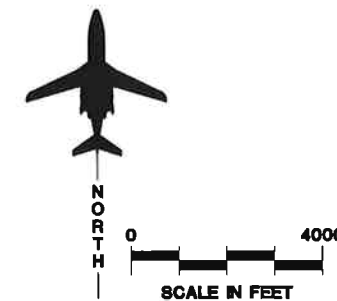
### LEGEND

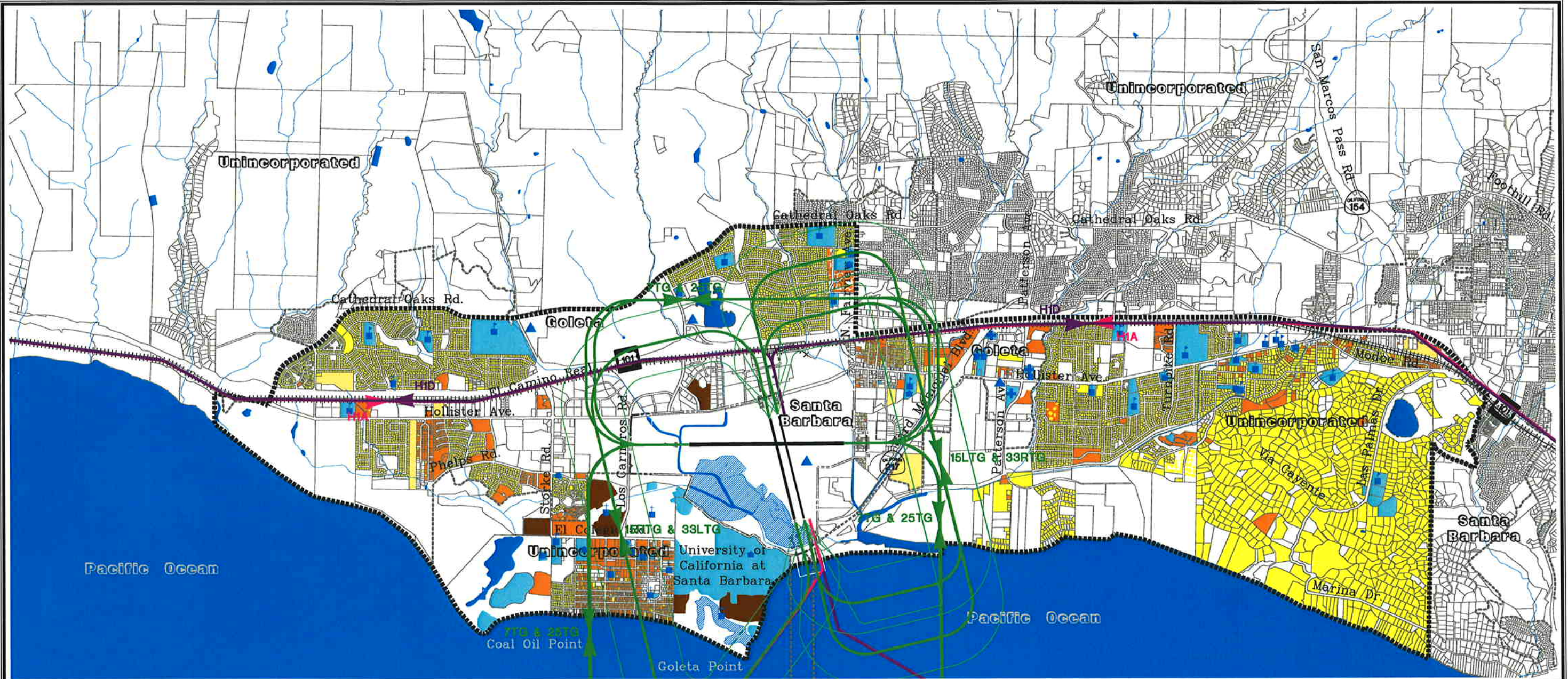
- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- Consolidated Arrival Tracks
- Consolidated Arrival Sub Tracks
- 6RDB Flight Track Designator
- Radar Arrival Tracks
- Yellow Manufactured Housing
- Yellow Single-Family Residential - 0 to 1 du/Acre

- Orange Multi-Family Residential - 1.1 to 3 du/Acre
- Brown High Density Residential - 14+ du/Acre
- Blue Noise Sensitive Institutions
- Blue Retirement Home
- Blue Place of worship
- Blue School
- Blue Hospital
- Blue Day Care Center
- Blue Historic Resource

- Blue Water
- Blue Marsh/Slough

Source: Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001.





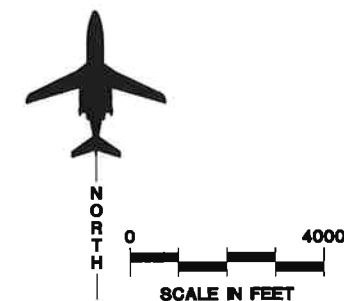
# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- Consolidated Helicopter Arrival Tracks
- Consolidated Helicopter Departure Tracks
- Consolidated Touch and Go Tracks
- Consolidated Touch and Go Sub Tracks
- 6RDB Flight Track Designator

- Manufactured Housing
- Single-Family Residential - 0 to 1 du/Acre
- Multi-Family Residential - 1.1 to 3 du/Acre
- High Density Residential - 14+ du/Acre
- Noise Sensitive Institutions
- Retirement Home
- Place of worship
- School
- Hospital

- Day Care Center
- Historic Resource
- Water
- Marsh/Slough

Source: Santa Barbara County Assessor's Database, April 2001.  
Field Survey March 19-24, 2001.  
Aerial Photography, April 30, 2001.  
Radar Flight Track Data from March 19-24, 2001.



expected noise level, as the INM contains tables of noise levels as a function of thrust values for each aircraft type. The speed of the aircraft affects the sound exposure level by affecting the duration of the noise event; *i.e.*, the slower the aircraft, the longer the noise event, and the higher the SEL value. The INM applies a standard correction for speed differences using a logarithmic function. Altitude affects the predicted noise levels. An aircraft that is closer to an observer is generally louder than an aircraft which is farther away. The INM tables of noise levels and thrust values are also tied to specific distances from which the INM interpolates the noise level at the observer, again using a logarithmic function.

There is no data currently available which reports the thrust values used by a given aircraft at a given location. The INM estimates the thrust settings from standard flight procedures reported by the aircraft manufacturers. Actual thrust settings may vary significantly as a result of specific local conditions during a flight, such as load, weather, and airline-specific flight procedures.

The radar flight track information can be used to collect altitude information for a set of flights by specific aircraft types. This process was used at Santa Barbara Airport for samples of departures on all runways on March 19, 20, and 21, 2001, by B-737-300, B-737-500, Regional Jet, and SF-340 series aircraft. Comparisons of the observed takeoff profiles to the takeoff profiles calculated by the INM, for represen-

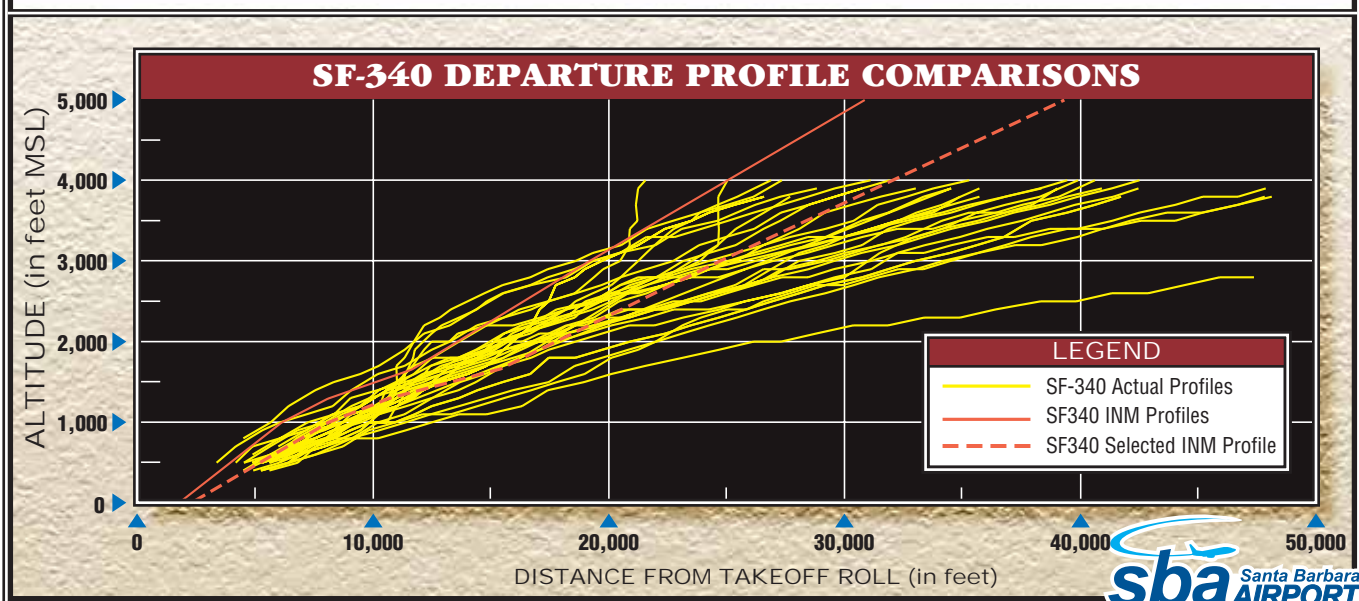
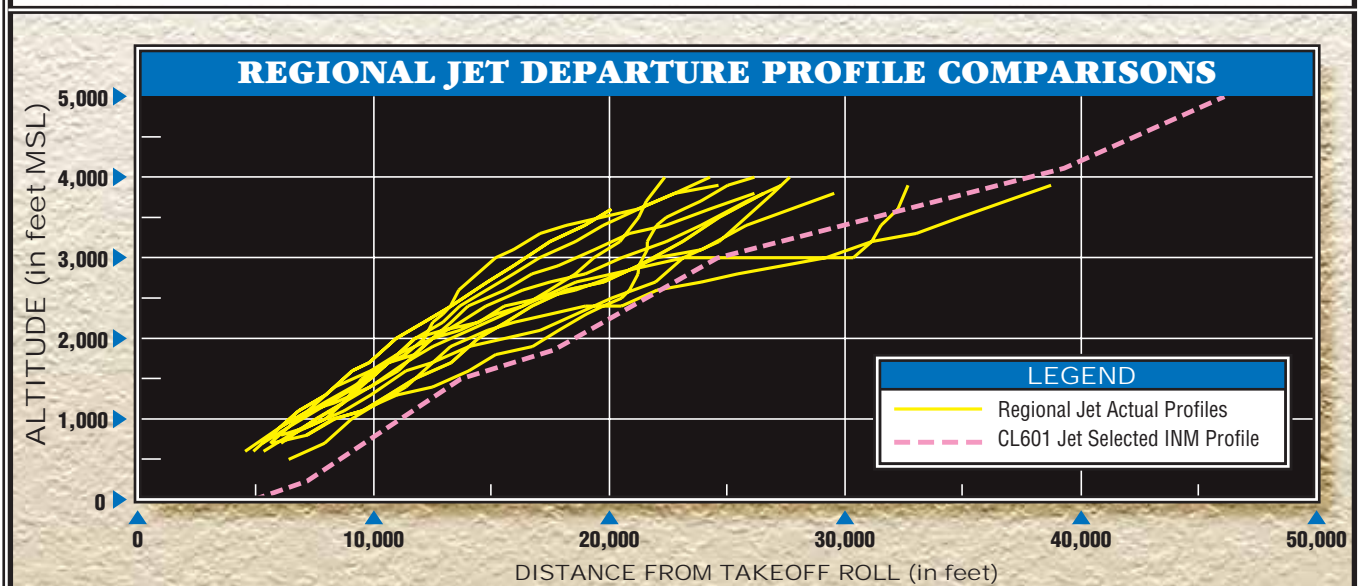
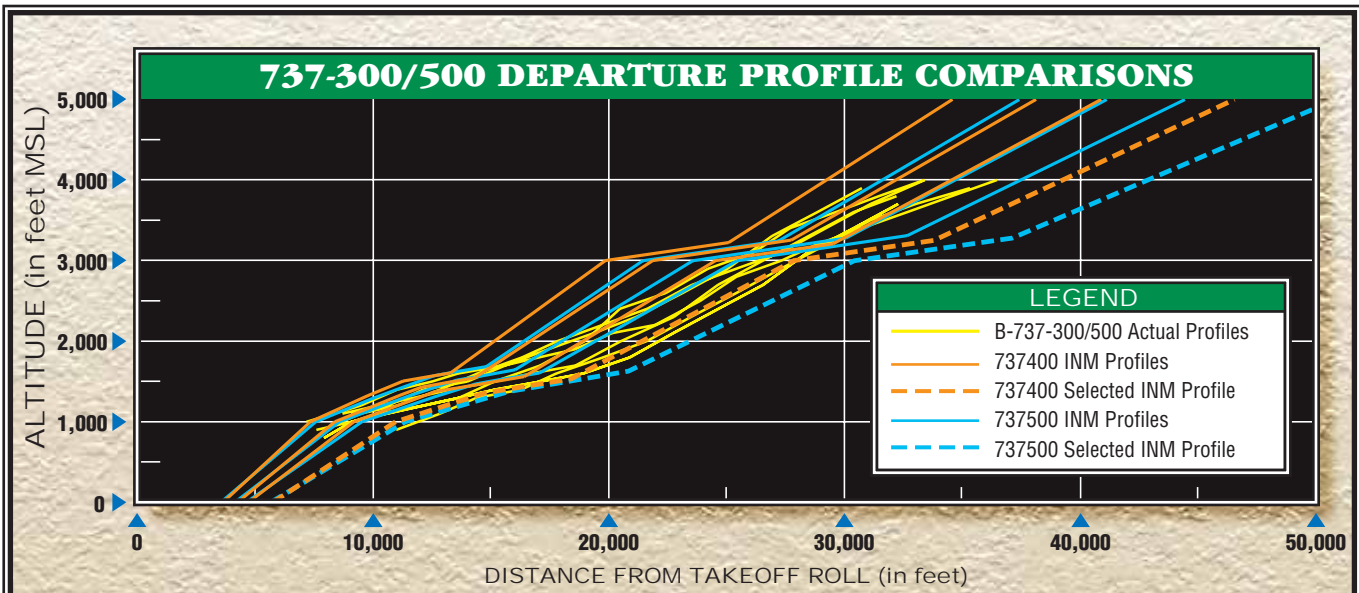
tative aircraft types, are shown by **Exhibits 3L**.

The INM provides four profiles for the 737400 (used to model the 737-300 aircraft) and 737500 aircraft. Each profile represents a stage length (destination distance) in miles. The steepest of 737 series profiles on **Exhibit 3L** represent stage length from zero to 500 miles. The second steepest profile line represents 501 to 1,000 mile stage lengths; the third steepest line 1,001 to 1,500 mile stage lengths, and the lowest profile line represents a stage length of 1,501 to 2,000 miles. The yellow lines on **Exhibit 3L** represent actual radar flight track profiles.

The Regional Jet profiles are depicted at the bottom of **Exhibit 3L**. As seen on **Exhibit 3L**, only one profile is available for the Regional Jet. This profile is below the actual radar profiles and, therefore, a conservative representation for the Regional Jet departures.

The SF-340 profiles are depicted at the bottom of **Exhibit 3L**. Only two profile stage lengths are available for the INM's SF340. The SF-340 flies to Los Angeles which is a Stage 1 length. However, the Stage 2 length falls in the middle of the radar profiles and was selected for input into the INM.

The remaining aircraft in the current fleet mix have only one profile available for modeling or data is not available to undertake a profile analysis. Therefore, a Stage 1 length was assumed.



## **Assignment of Aircraft to Tracks**

The final step in developing input data for the INM model is the assignment of aircraft to specific flight tracks. In order to assign these, specific flight tracks, runway utilization, and operational statistics for the various aircraft models using Santa Barbara Airport were evaluated.

The radar flight track data was used to determine flight track percentages for each aircraft type. The radar flight tracks that formed the consolidated tracks and sub-tracks were first counted. Then each consolidated track was assigned a percentage, based on the total number of tracks for each runway.

To determine the specific number of aircraft assigned to any one flight track, a long series of calculations was performed. This included the number of specific aircraft of one group factored by runway utilization and flight track percentage. A detailed listing of these assumptions is provided in **Appendix D**.

## ***INM OUTPUT***

### **2003 NOISE EXPOSURE CONTOURS**

Based upon the data and assumptions described above, the Integrated Noise Model (INM) was used to prepare a noise exposure map representing existing conditions. **Exhibit 3M** shows the locations of the 60, 65, 70, and 75 CNEL contours calculated by the INM for the base year (2003). **Table 3F** lists the land areas calculated by the INM as

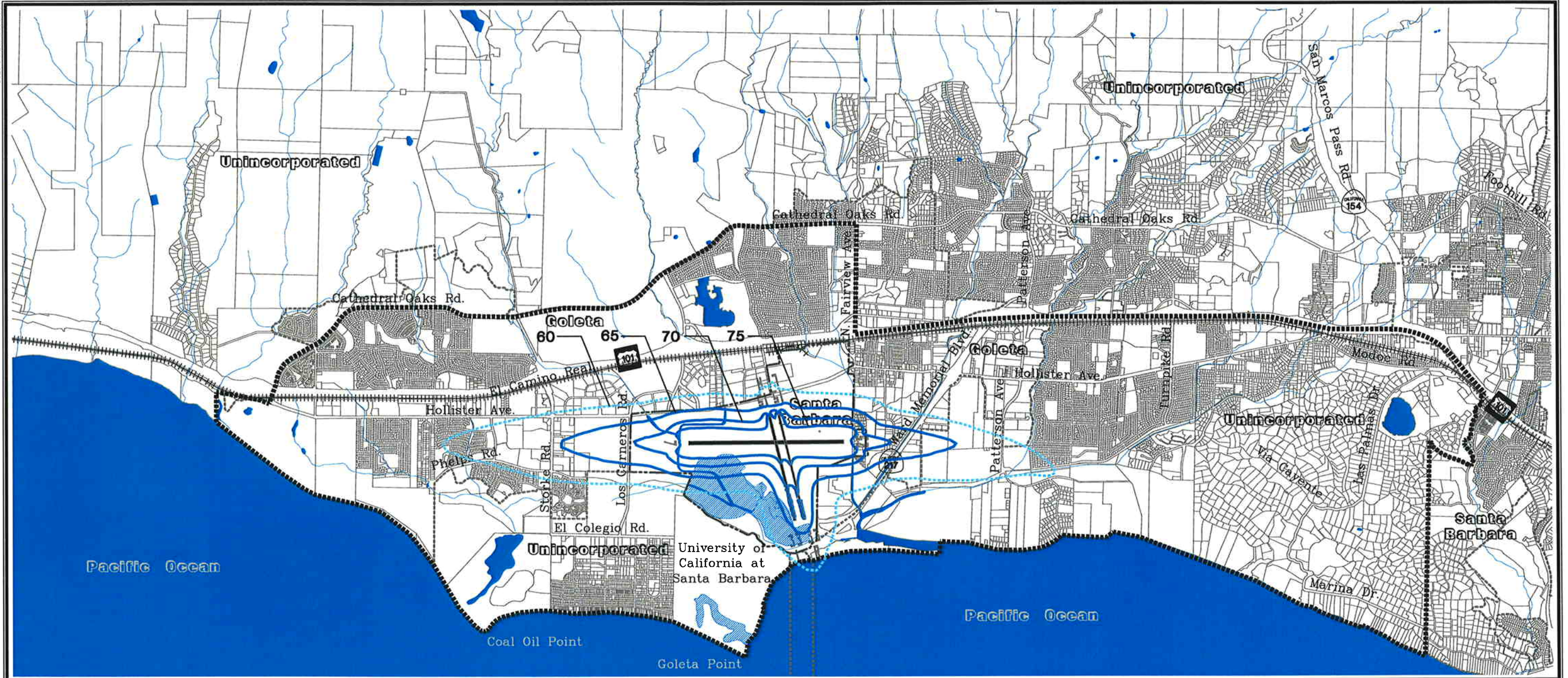
included within the 60, 65, 70, and 75 CNEL contours in the base year. While the 65 CNEL contour is considered the threshold of significance by the FAA, the 60 CNEL contour is being depicted to conform with local land use regulations as described in Chapter One. Areas contained within the 60 CNEL contour are considered to be “marginally impacted” by noise.

The shape and size of the contours reflect the underlying flight track and runway use assumptions. The outermost noise contour represents the 60 CNEL noise contour. The 60 CNEL noise contour is cigar-shaped to the west, reflecting the narrowing of the arrival tracks along the instrument approach course. To the east, the 60 CNEL has a slight curve due to departures turning to the south over the ocean.

The 65 CNEL contour has the same general shape as the 60 CNEL, except smaller. The 70 and 75 CNEL contours generally follow the shape of the runway system.

The 60 CNEL contour extends about 7,400 feet west of the Airport property. To the east, the 60 CNEL contour extends about 7,700 feet. To the north, the 60 CNEL contour bows out just beyond Hollister Avenue. To the south, the 60 CNEL contour bows out to just past the coastline.

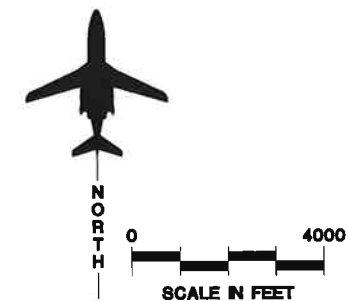
The 65 CNEL contour extends about 2,700 feet west of the Airport property, just before Storke Road. To the east, the 65 CNEL contour extends about 3,500 feet. To the north and south, the 65



# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- CNEL Noise Contour, Marginal Effect
- CNEL Noise Contour, Significant Effect
- Water
- Marsh/Slough

Source: Coffman Associates Analysis.



CNEL contour remains on Airport property.

The majority of the 70 CNEL contour remains on Airport property, but spikes

off Runway 7-25 1,000 feet to the east off Airport property. The 75 CNEL is completely contained on Airport property.

**TABLE 3F**  
**Calculated Land Areas Within CNEL Contours**  
**Santa Barbara Airport**

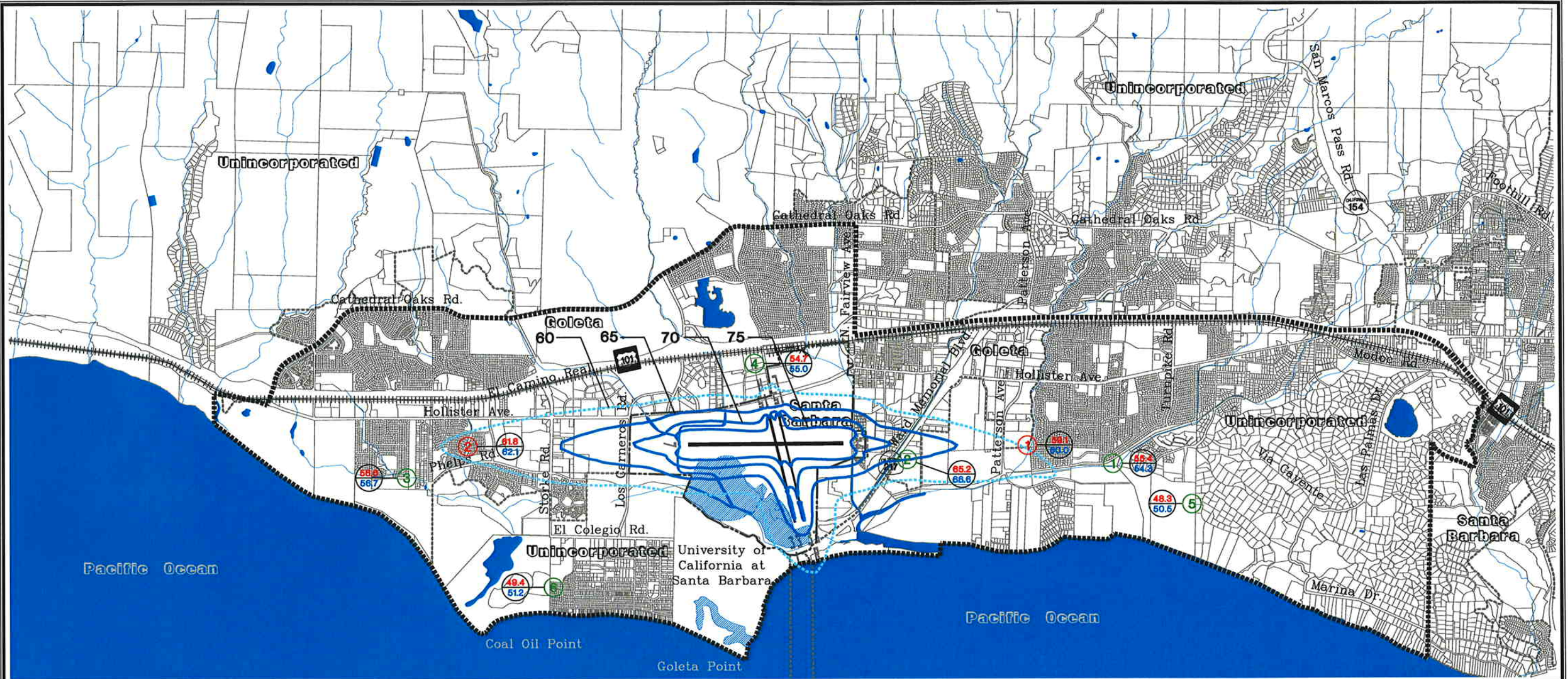
CNEL Contour Value, dB	Area (Square Miles)		
	2003	2008	2025
60	2.62	2.31	2.17
65	1.16	1.02	0.90
70	0.55	0.48	0.41
75	0.30	0.26	0.22

Source: Coffman Associates Analysis

### Comparative Measurement Analysis

This analysis compares the INM-predicted average daily CNEL values with actual noise measured at each noise monitor site, as well as the two permanent monitor sites. The noise level data collected from each noise monitoring site was used to calculate the average 24-hour CNEL values (CNEL (24)) at each site. The INM was used to calculate the CNEL values at each of those sites for annual average operations, based upon the inputs previously described. A comparison of the measured and predicted (by INM) CNEL values at each monitoring site is presented in **Table 3G** and is illustrated on **Exhibit 3N**.

A difference of two to three CNEL is generally not considered a significant deviation between measured and calculated noise, particularly at levels above 65 CNEL. Additional deviation is expected at levels below 65 CNEL. As seen on **Table 3G**, the agreement between measured CNEL(24) and predicted CNEL values was within 1.8 CNEL in the vicinity of the 65 CNEL contour, which is considered to be within the allowable deviation and standard tolerances of the noise measurement equipment. Deviations below 60 CNEL are ranged from 0.1 to 2.3 CNEL. Overall, the noise measurements support the INM assumptions to the 2003 noise exposure contours.



# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- CNEL Noise Contour, Marginal Effect
- CNEL Noise Contour, Significant Effect
- Water
- Marsh/Slough

- ① Permanent Noise Monitor Terminal
- ③ Temporary Noise Monitor Terminal
- 83.7  
83.6 Actual CNEL Noise Measurement  
INM-Predicted CNEL, 2001

Source: Santa Barbara Municipal Airport  
Permanent Noise Monitoring System,  
March 2000 to February 2001.  
Airport Noise Monitoring:  
Site 1 - March 2 to April 3, 2003  
April 24, 2003  
Site 2 - March 2 to April 3, 2003  
February 19-20, 2003  
Site 3 - February 27, 2003  
Site 4 - February 22, 2003  
Site 5 - May 7, 2003  
Site 6 - April 30, 2003

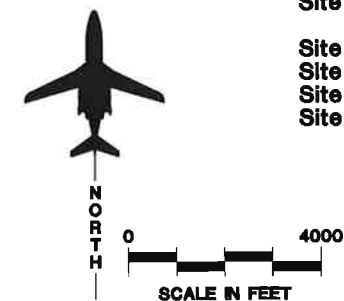


TABLE 3G Comparison of Measured and INM-Predicted CNEL Values at Permanent Noise Monitoring Terminals			
Noise Monitor Terminal Number	CNEL, dB		Difference, dB
	Measured	2003 INM Prediction <sup>1</sup>	
Part 150 Noise Measurement Sites <sup>2</sup>			
1	57.3	55.0	-2.3
2	59.7	60.1	+0.4
3	57.9	55.8	-2.1
4	55.9	55.8	-0.1
5	50.6	52.4	+1.8
6	50.9	48.7	-2.2
Permanent Noise Monitor Sites <sup>3</sup>			
1	57.7	59.5	+1.8
2	62.0	61.1	-0.9
<sup>1</sup> Coffman Associates Analysis <sup>2</sup> Santa Barbara Airport Noise Van - March 19, 20, 22, 27; April 24, 30; and May 7, 2003. <sup>3</sup> Measured Data from May 2002 through April 2003			

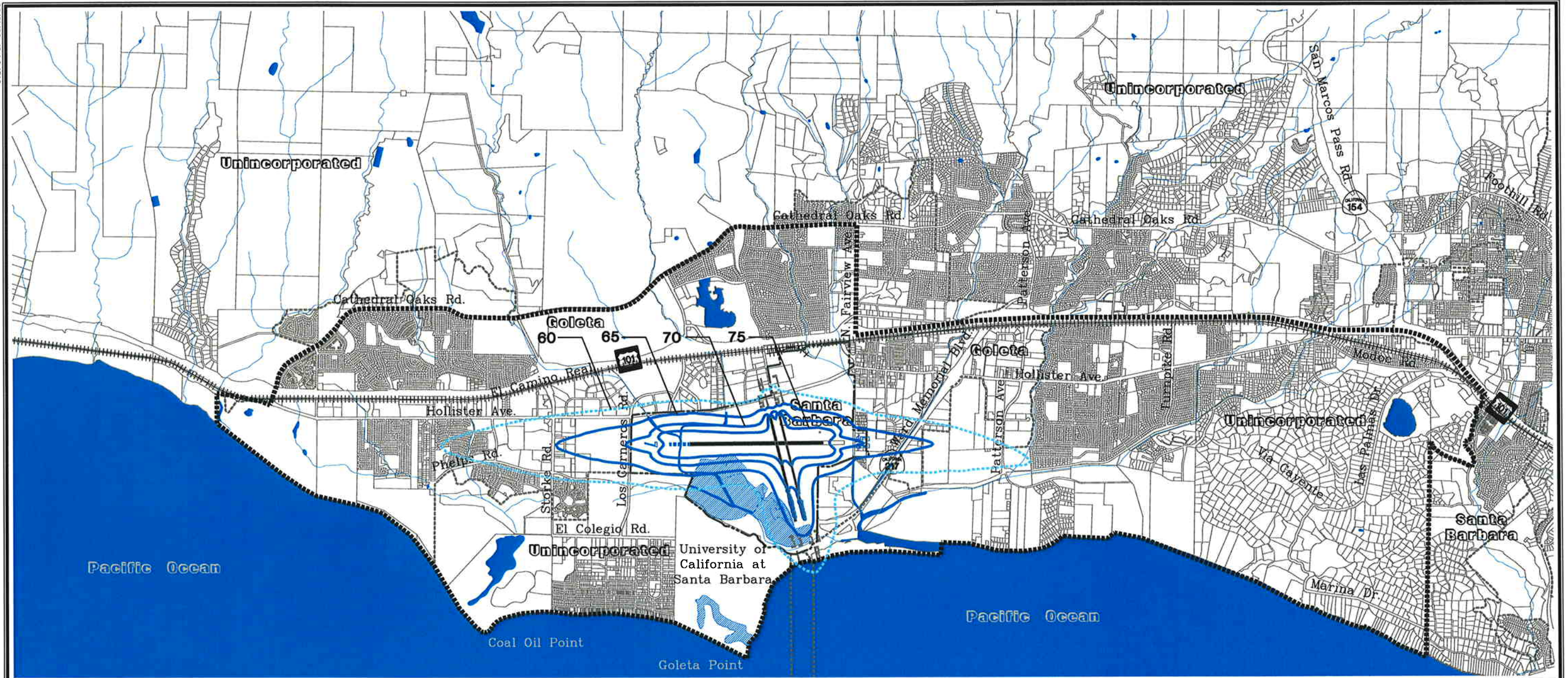
## **FORECAST 2008** **NOISE EXPOSURE CONTOURS**

The 2008 noise contours represent the estimated noise conditions based on the forecasts of future operations and with Runway 7-25 shifted 800 feet to the west. This analysis provides a near-future baseline that can subsequently be used to judge the effectiveness of potential noise abatement alternatives later in the study. **Exhibit 3P** presents the plotted results of the INM contour analysis results for 2008 conditions, using input data described previously.

The 2008 noise contours are very similar in shape but slightly smaller

than the 2003 noise contours. This is primarily due to the gradual phase-out of Stage 2 business jet and hushkitted Stage 3 aircraft from the fleet. **Table 3F** lists the land areas calculated by the INM as included within the 60, 65, 70 and 75 CNEL contours for the year 2008. The land area within the 60 CNEL contour is expected to decrease in 2008 by about 3.0 percent as compared to the 2003 base year. The 60 CNEL contour is presented to depict areas of “marginal impact.” FAA utilizes the CNEL contour to determine area of “significant impact.”

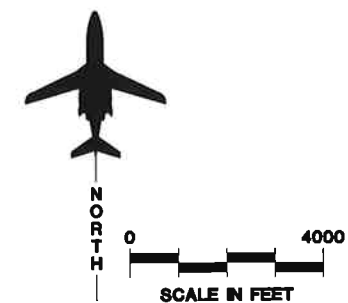
The 60 CNEL contour extends about 7,500 feet west of the Airport property.



# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- ..... Runway Shift 800'
- ..... CNEL Noise Contour, Marginal Effect
- ..... CNEL Noise Contour, Significant Effect
- Water
- Marsh/Slough

Source: Coffman Associates Analysis.



To the east, the 60 CNEL contour extends about 6,200 feet. The contour to the east is slightly elongated when compared to the 2008 60 CNEL contour. Although engine technology advancements have resulted in quieter aircraft, the contours, nonetheless, start to expand again due to forecasted increases in operations at the Airport. To the north, the 60 CNEL contour bows out just beyond Hollister Avenue. To the south, the 60 CNEL contour bows out to just beyond the coastline.

The 65 CNEL contour extends about 2,900 feet west of the Airport property to Storke Road. To the east, the 65 CNEL contour extends about 2,600 feet. To the north and south, the 65 CNEL contour remains on Airport property.

The 70 CNEL contour primarily remains on Airport property, with a 200-foot spike to the west. The 75 CNEL is completely contained on Airport property.

## **FORECAST 2025 NOISE EXPOSURE CONTOURS**

The 2025 noise contours represent the estimated noise conditions based on the forecasts of future operations. The analysis provides a long term future baseline that can also be used to judge the effectiveness of proposed noise abatement procedures and land use planning recommendations. The 2025 contours are being provided for informational purposes only. Only the existing (2003) and five year (2008) noise contours will be accepted by the FAA. **Exhibit 3Q** presents the plotted

results of the INM contour analysis for 2025 conditions.

The 2025 noise contours are more spike-shaped than the 2003 and 2008 noise exposure contours. This is primarily due to the continued phase-out of the Stage 2 business jets and hushkitted Stage 3 aircraft. The land area within the 60 CNEL 2025 noise contour is expected to decrease by about 17 percent as compared to the year 2003. **Table 3F** lists the land areas calculated by the INM as included within the 60, 65, 70, and 75 CNEL contours for the year 2025.

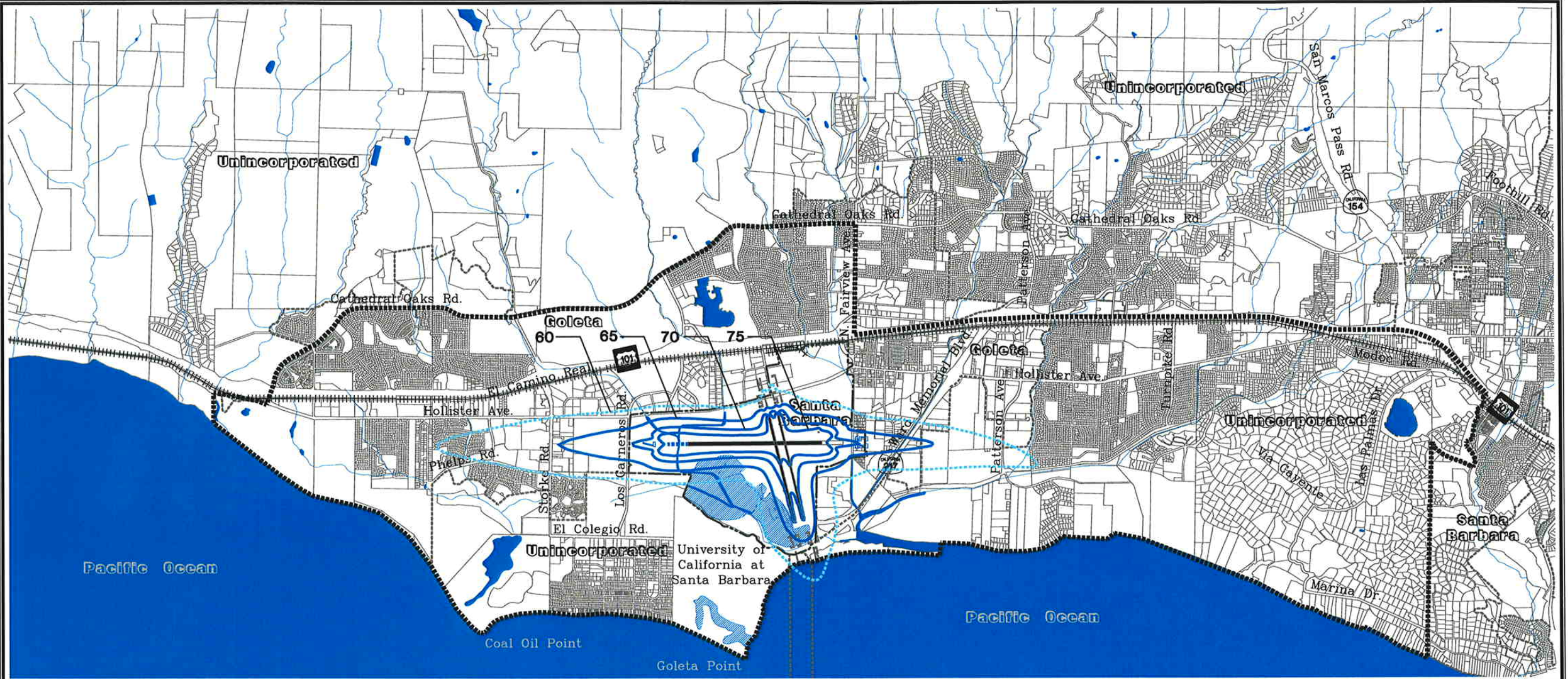
The 60 CNEL contour extends about 7,500 feet west of the Airport property. To the east, the 60 CNEL contour extends about 6,800 feet. To the north, the 60 CNEL contour continues to bow out just beyond Hollister Avenue. To the south, the 60 CNEL contour bows out just beyond the coastline.

The 65 CNEL contour extends about 2,800 feet west of the Airport property, just short of Storke Road. To the east, the 65 CNEL contour extends about 2,700 feet. To the north and south, the 65 CNEL contour remains on Airport property.

The 70 and 75 CNEL contours are completely contained on Airport property.

## **SUMMARY**

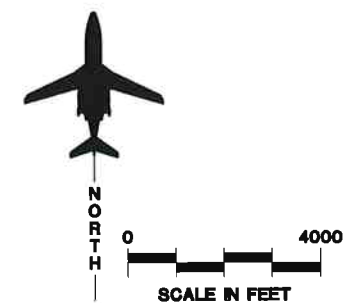
Noise Exposure Maps (NEM) have been prepared for Santa Barbara Airport for



# LEGEND

- ..... Detailed Land Use Study Area
- Municipal Boundary
- Airport Property
- +++++ Railroad Tracks
- ..... Runway Shift 800'
- ..... CNEL Noise Contour, Marginal Effect
- ..... CNEL Noise Contour, Significant Effect
- Water
- Marsh/Slough

Source: Coffman Associates Analysis.



the study years 2003, 2008, and 2025. The noise exposure maps were prepared using the FAA Integrated Noise Model (INM), Version 6.1, based upon data obtained from the FAA tower counts, radar flight track data, and forecasts of future airport operations from the current Airport Facilities Plan. This methodology is accepted by the FAA for F.A.R. Part 150 studies.

The noise exposure map that describes existing conditions (2003), reasonably represents actual measured noise levels taken during the spring of 2003, in

terms of both single event and cumulative noise levels. The predictions of future noise levels account for the planned changes in airfield configuration and expected changes in aircraft operations.

The noise exposure maps indicate that the overall aircraft noise exposure in the vicinity of the airport will be reduced in the years 2008 and 2025, primarily as a result of the gradual phase-out of Stage 2 business jet and hushkitted Stage 3 aircraft over the next 20 years.

## ***References***

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Integrated Noise Model (INM), Version 6.0. Federal Aviation Administration, Office of Environment and Energy (AEE-120), September 1999.

Helicopter Noise Exposure Curves for Use in Environmental Impact Assessment, Report No. FAA-EE-82-16, Federal Aviation Administration, Office of Environment and Energy (AEE-120), November 1982.